

titrust Law, 1993 Supplement, Little Brown, 1993, at 808-14; Owen and Braeutigam, chap. 1). When a wholesale supplier, such as a facilities-based cellular provider, uses a dual distribution system in which it offers service both through company-owned retail outlets and through independent resellers, complaints by the independent resellers are common. Switch-based interconnection or unbundling may be denied because it would be inefficient, and a complaint may be nothing more than an effort to obtain service at an artificially low price.

9. *Sixth*, regulations that attempt to mandate CMRS-to-CMRS interconnection and switch-based interconnections with resellers will promote inefficient interconnections, and deter or distort investments in the rapidly expanding and changing market for mobile services.

10. *Seventh*, parties that favor regulation of cellular carriers have offered analyses and data that allegedly demonstrate that cellular carriers have been exercising market power. None of them, individually or collectively, demonstrates the exercise of market power. Most of the claims about anticompetitive behavior are based on faulty economic analysis. By contrast, there is evidence of sufficient competitive behavior and benefits to consumers to justify continued forbearance from economic regulation.

11. *Eighth*, based on my review of the evidence, it is my opinion that neither cellular systems nor other CMRS providers control essential facilities. Little of the alleged evidence of anticompetitive behavior survives careful economic analysis. Regardless of their concentration levels, there is no sound basis for a conclusion that cellular systems have been exercising significant market power. There is evidence of competition, and concentration will fall substantially over the next several years. Consequently, there is no empirical basis for believing that there is a problem with market performance that would warrant regulating CMRS pricing, CMRS interconnection decisions, or the relationships between facilities-based CMRS providers and resellers. Thus, the Commission should extend its historical forbearance from rate and

tariff regulation of this industry to include forbearance from interconnection regulations.

12. I have concluded that decisions on interconnection and bundling are best left to the market rather than being subjected to regulation. There is no persuasive evidence that obligations to provide interconnections, other than those that result from market forces, would have significant benefits, but such obligations are likely to have substantial costs. Interconnection obligations, as well as other types of regulation such as mandatory unbundling of services sold to CMRS resellers, would therefore be likely to harm consumers.

III. Market Structure and Performance

A. *Importance of Market Structure and Performance*

13. In order to assess any potential regulation, it is useful to begin by considering the implications of leaving decisions to market forces. This is commonly done in an antitrust context by defining a relevant market and then evaluating market concentration, conditions of entry, and other structural and behavioral evidence relating to the likelihood that suppliers have, or may come to have, unilateral or collusive market power. If market power exists, or is likely to develop, then regulatory interventions may have benefits in preventing or stemming exclusionary or other anti-competitive behavior. Even if such benefits may result, however, they must be weighed against the fact that the regulatory intervention will impose its own costs, distortions, or disincentives. It would be wrong to assume that an imperfect market can be replaced with perfect regulation.

14. In the case of mobile communications services, it is generally acknowledged that the market is becoming more competitive as a result of changes in technology and various Commission initiatives that will permit or promote entry. The key question with respect to interconnection and unbundling obligations is whether they are likely to be cost-effective

in the future world to which they will be applied. However, it is useful to examine the evidence on present and past competitive conditions to the extent that such evidence sheds light on likely future conditions.

15. Several states that currently regulate cellular rates, as well as resellers and consultants working on their behalf, have proffered a variety of theoretical and empirical analyses that purportedly demonstrate that cellular carriers are currently exercising market power by charging supra-competitive prices and restricting output. In this section I will evaluate a number of those analyses, with examples of sources where they have been presented.

B. *Appropriate Standard for Intervention*

16. This proceeding involves the question of government intervention to force certain firms to interconnect with others in circumstances where they would not otherwise do so. Such intervention can be justified in only two circumstances: (1) There is an *antitrust problem*, with persuasive evidence of the exercise of sustained monopoly power that is created or enhanced by the refusal to interconnect; or (2) there is an *externality problem*, with strong evidence that in the absence of government intervention some pathology in the market will lead decentralized competitors to make systematically incorrect decisions with respect to interconnection.

17. Two types of antitrust problems are potentially relevant. The first involves the essential facilities theory. To be based on that theory, mandated interconnection requires a monopoly with control over facilities that are essential for other firms to compete with it in a downstream market. The second type of antitrust problem requires a collusive arrangement among incumbent competitors to exclude entrants or raise rivals' costs by denying access to such facilities. The analysis of market structure and performance below is intended to assess whether there is, or is likely to be, a monopoly or collusive agreement to exclude competitors in the relevant markets.

18. The essential facilities theory is not relevant to either mandatory CMRS-to-CMRS interconnection or mandatory interconnection to switch-based resellers. An “essential facility” can be defined as a facility “essential to a competitor’s survival” in a relevant market (Dennis W. Carlton and Jeffrey M. Perloff, *Modern Industrial Organization*, Scott, Foresman, 1990, at 763). The Commission has recognized that “CMRS providers do not have control over bottleneck facilities” (*Second Report* at ¶237).

19. The essential facilities theory is not relevant to mandatory CMRS-to-CMRS interconnection for three reasons. First, CRMS providers are able to connect with each other through the local exchange carrier, and hence direct interconnections are not necessary. Second, there are at least two CMRS providers in a given geographic area, and in the future there will be more. Consequently, the facilities they have are not controlled by a single firm. Third, many CMRS providers do not compete with the CMRS providers with which they might wish to interconnect.

20. Similarly, the essential facilities theory cannot be used to justify obligations for facilities-based CMRS providers to interconnect with switch-based resellers or to unbundle the services that they sell to resellers. First, resellers are already able to interconnect on a nonswitched basis with facilities-based CMRS providers and to obtain services on a nondiscriminatory basis from those providers. Consequently, switch-based interconnections and unbundling of services are not necessary. Second, there are at least two CMRS providers in each geographic area, and in the future there will be more. Consequently, CMRS facilities are not controlled by a single firm. A reseller that wants to obtain cellular-type services can presently obtain them from at least the two facilities-based cellular providers, and in the future such services are also likely to be available from personal communications services (PCS) providers and enhanced specialized mobile radio (ESMR) providers.

21. An antitrust justification for the regulations in question requires a demonstration that CMRS providers have been exercising significant

market power and that they are likely to continue to do so in spite of the new entry that is expected in the near future. Because one cellular provider could undercut efforts by the other to exercise market power unilaterally, the exercise of market power would require coordinated behavior or collusion by at least the two cellular providers, and in the near future PCS and ESMR providers would have to participate in the collusion as well. It is therefore important to evaluate the available evidence on the structure and performance of markets for CMRS, which I do beginning with Section III.C of my declaration.

22. In contrast to merger analysis, where possible harms to competition are prospective, a condition for imposing mandatory interconnection as a remedy for an antitrust problem is strong evidence that exclusion has actually taken place. Otherwise, the case for intervention is insufficient to overcome the presumption that market forces will lead competing firms to make pro-competitive interconnection decisions. Further, a requirement that competitors and others be given access to a company's facilities can stifle incentives to invest in new technology and create "free rider" problems, resulting in harm to consumers.

23. With regard to the second of the two circumstances described in ¶14, mandated interconnection in the case of systematic market failure requires a demonstration that the direction of standardization with respect to interconnection has taken an adverse turn from which decentralized competitive firms cannot, individually, extricate themselves. This condition might arise, for example, in the case of a so-called "network externality." As with the potential antitrust problem, there must be strong evidence that events are in fact unfolding in a pathological way. So far as I know, no one has claimed that such a problem exists, or will exist, in this industry, and I will not discuss it further in this declaration.

24. A number of the analyses addressed in the remainder of Section III of my declaration are based on the economic paradigm contained in the Department of Justice and Federal Trade Commission 1992 Horizontal Merger Guidelines (4 Trade Reg. Rep. (CCH) ¶13,104). However, it is im-

portant to point out that the Merger Guidelines are designed for an entirely different purpose than evaluation of proposals to regulate the behavior of companies. Section 7 of the Clayton Act (38 Stat. 730 (1914), 15 U.S.C.A. §18 (1993)), and the Guidelines that express the intentions of the federal enforcement authorities, are aimed at stopping mergers that may have the effect of reducing competition. The concern is with an incipient effect on competition. The Guidelines and their associated analytical mechanism are not necessarily applicable in determining whether prices at present are above competitive levels, whether companies are engaged in other anticompetitive activities, or whether regulations to deal with such problems would be appropriate. Indeed, the Guidelines explicitly consider whether a proposed merger is likely to make a given market less competitive, not whether that market is competitive to begin with.

25. Further, because the Guidelines are concerned with mergers, the potential benefits of which can often be achieved through internal growth of individual competitors, they employ a much stricter standard than may be relevant to other areas of antitrust analysis or public policy, such as the remedies for monopoly or decisions to regulate. Indeed, the Department of Justice itself has explicitly recognized that the market concentration thresholds in the Guidelines are not applicable to behavioral regulation. In contrast to the Herfindahl-Hirschman Index (HHI) threshold of 1800 (which corresponds to between 5 and 6 equal-sized competitors) used in merger evaluation, in its analysis of oil pipeline markets the Department of Justice concluded that in making an initial determination about whether to deregulate certain pipelines it was appropriate to use a threshold of four firms (which corresponds to an HHI threshold of 2500 or higher):

This HHI standard for initial high-risk status for pipeline markets is higher than the 1800 level used to demarcate highly concentrated markets in the Department's Merger Guidelines because of the different purpose served by the index. A higher threshold is used for suggesting that pipeline regulation may be appropriate than for determining that a merger is liable to lead to the exercise of market power because regulation itself im-

poses significant costs, whereas the economies foregone, if any, when a particular merger is prevented are apt to be less significant. (*Competition in the Oil Pipeline Industry: A Preliminary Report*, May 1984, at 28.)

26. Finally, the Guidelines themselves, by their terms, are necessarily concerned with probabilities, not certainties—because no one can predict with certainty the effects of a proposed merger.

C. *Market Definition*

1. Purpose of Market Definition

27. To be useful in analyzing competitive conditions, market shares and concentration must be computed for properly defined antitrust markets. A group of products or services and an associated geographic area constitutes an antitrust market if it is the smallest set of products and the smallest area capable in principle of being profitably monopolized. In other words, if one assumed that a hypothetical single firm controlled the supply of all the products in question, and if that firm could increase its profits by raising prices significantly above competitive levels, then an antitrust market has been defined. However, if a price increase by a hypothetical single firm would be unprofitable because consumers would switch in significant numbers to other products, then the market has been defined too narrowly for antitrust analysis.

2. Relevant Product Markets

28. Cellular services may be competitive with certain landline services, such as intra-LATA toll service, pay telephone service, and telemetry service (*Financial Services Report*, May 25, 1994; *Electric Utility Week*, Aug. 29, 1994, at 7). Cellular services would be competitive with additional landline services but for the fact that residential local exchange services are priced below costs. For customers with relatively long local loops, landline service costs are likely to be similar to or greater than cellular service costs. To analyze some policy issues, it is therefore appropriate to define

relevant antitrust markets that include both cellular and landline services. Nevertheless, for the purposes of the present declaration I make the conservative assumption that landline services are not in the relevant product market in which cellular and cellular-type services compete.

29. Among the relevant product markets in which cellular services may compete, the one that is now, and is likely to remain, most concentrated is *mobile telecommunications services*, which I define as the collection of services of the type that cellular and broadband PCS offer or will offer within the next three to five years. As I will explain further below, at a minimum the participants in this market include cellular providers and broadband PCS providers with at least 20-30 MHz of spectrum. Participants are also likely to include broadband PCS licensees with 10 MHz of spectrum and ESMR providers with 5-10 MHz of spectrum. There may eventually be other participants as well, such as satellite-based services. Also, in some cases consumers are likely to be in a position to substitute landline telephone, paging, and two-way mobile radio services for cellular-type services.

30. The definition of the mobile telecommunications services market used in this declaration is based on the fact that cellular, PCS, and ESMR licensees are all authorized by the Commission to provide the full array of mobile services (Stanley M. Besen and William B. Burnett, "An Antitrust Analysis of the Market for Mobile Telecommunications Services," Charles River Associates, Dec. 1993, at 1 n.1, and at 17-18). It is also based on the conclusion that "all portions of the electromagnetic spectrum that have been allocated to the provision of mobile telecommunications services can be used to provide all of the same services and at about the same cost" (Besen and Burnett at 18).

31. My definition of a relevant antitrust product market for mobile telecommunications services is consistent with the analysis of Besen and Burnett, who define a single relevant antitrust market for all mobile services, including cellular, PCS, and ESMR. In their discussion of the market, Besen and Burnett include services such as paging that require only

limited amounts of spectrum. However, in computing concentration in the market, they include only cellular providers, broadband PCS providers (which will have at least 10 MHz of spectrum as a result of Commission licensing), and—in some of their calculations—ESMR providers with 5-10 MHz of spectrum.

32. Cellular systems may also compete in narrower relevant product markets, such as *wireless data transmission services* and *paging services*. However, any such narrower product market that may exist would have more participants and be less concentrated than the market defined for mobile telecommunications services. Because of the additional competitors and scope for entry in a narrower market, insofar as the regulations at issue in the present proceeding are concerned no additional competitive issues are likely to arise in such markets that do not arise in a market for mobile telecommunications services.

3. Relevant Geographic Markets

33. Mobile telecommunications service suppliers compete in providing services in connection with both local and long-distance calls. The precise geographic areas appropriate for analysis of both local and long-distance calls is complicated by the fact that the relevant licensees (cellular A, cellular B, broadband PCS A and B, broadband PCS C-F, and ESMR) serve or will serve different, overlapping areas.

34. In order to define geographic markets in any specific situation, one must determine the extent of feasible geographic price discrimination. To the extent that price discrimination is not feasible, and uniform prices must be charged over a wide geographic area, geographic markets will be broader than if price discrimination is feasible. The broader are geographic markets, the greater will be the number of participants in the markets, and the lower will be concentration. For example, if the geographic market is broader than the Basic Trading Areas (BTAs) used for some of the broadband PCS licenses, the number of broadband PCS competitors in the market will exceed the number of licenses (including Ma-

for Trading Area (MTA) licenses) valid in any single BTA. The market share and concentration measures computed below, as well as those presented by Besen and Burnett and others, are likely to be biased upward because they are based on the implicit assumption that cellular licensees in different MSAs and PCS licensees in different BTAs are not in the same antitrust geographic markets (Besen and Burnett at n. 46 make the same point).

D. Competitors for Cellular in Mobile Telecommunications

1. Broadband Personal Communications Services

35. Digital personal communications services are being licensed in two portions of the radio spectrum. Broadband PCS will be in the 1850-1975 MHz range, while narrowband PCS will be in the 900 MHz range.

36. There will be three 30 MHz broadband licenses and three 10 MHz broadband licenses.

37. There is general agreement that at least the 30 MHz broadband PCS licensees will compete with cellular providers. One observer has predicted that "broadband PCS systems will evolve primarily into cellular competitors. ... [E]conomic factors all suggest that the larger PCS systems, say 30 MHz MTA-wide systems, necessarily must target cellular subscribers ... to become their customers" (*Cellular Business*, March 1994, at 14, 16). According to Commissioner Andrew C. Barrett, "The three 30 MHz allocations, two at the MTA level and one at the BTA level, will provide significant opportunities for new entrants to compete against cellular providers and the emerging Enhanced Specialized Mobile Services market. This new framework achieves one of my policy goals of ensuring that at least three new PCS providers have a real opportunity to offer competitive alternatives to existing cellular players" (*TR*, June 13, 1994, at 5). A Commission staff report suggests that competitive PCS services can generally be offered with 20 MHz of spectrum (David P. Reed, *Putting It All Together: The Cost Structure of Personal Communications Services*, Federal Communications Commission, Office of Plans and Policy, 1992, at vii-ix). In addition, the

Commission has stated that “narrowband PCS services may compete with cellular to some extent” (*Second Report* at ¶148).

38. Industry predictions suggest that PCS systems may have advantages over cellular systems, for example, additional service options, superior voice quality, smaller, lighter, cheaper handsets, and perhaps lower costs (*TR Wireless News*, June 30, 1994). Time Warner Telecommunications has been testing a technology that would make use of existing cable television plant to reduce the cost of deploying PCS services (*Multichannel News*, June 6, 1994, at 2). According to one industry analysis, “Putting all of these factors together, it does seem that PCS has at least a fighting chance to significantly underprice cellular services” (*TR Wireless News*, July 14, 1994).

39. One indication that those in a position to have the best information believe that PCS systems will be significant competitors is the substantial interest in, and the prices that companies are expected to bid for, PCS licenses.

40. Three pioneer preference 30 MHz MTA licenses have been awarded by the Commission. Remaining broadband PCS licenses presumably will be awarded next year. Thirty MHz broadband PCS licensees are required by the Commission to offer service to at least one-third of the population of their market areas within 5 years and two-thirds within 10 years. Ten MHz licensees will be required to cover 25 percent within 5 years (*TR*, June 13, 1994, at 5).

2. Enhanced Specialized Mobile Radio Services

41. Specialized Mobile Radio (SMR) and ESMR service, like cellular service, uses spectrum in the 800-900 MHz range. The Commission has allocated 19 MHz to SMR/ESMR (*Second Report* at n. 296). In part because of restrictions imposed by the Commission, SMR has been used primarily for fleet radio-dispatch service. While most SMR systems currently use analog technology, according to a recent study 23 percent of the SMR industry is planning to implement digital technology in the next year. Digital tech-

nology will substantially increase capacity and permit firms to offer ESMR service, including integrated voice, messaging, paging, dispatch, and data services (*Land Mobile Radio News*, April 1, 1994; *Communications Week*, June 6, 1994, at 33).

42. Hausman concludes that "ESMR will provide a close substitute to cellular service" (Jerry A. Hausman, "Affidavit," *United States v. Western Electric Co., et al.*, D.D.C., 1992, at 16). Although ESMR may have certain handicaps compared to cellular (*Second Report* at ¶143), ESMR may offer a wider array of services. According to an industry analyst, many "customers were using SMR and cellular as two separate services, and now Nextel is offering them a package deal. Nextel also offers some advanced messaging capabilities that only a handful of cellular providers have begun to offer" (*Communications Week*, May 30, 1994, p. 31).

43. Nextel, Dial Page, and OneComm have been acquiring SMR systems nationwide and entering into agreements to provide regional, and eventually national, ESMR service (*Communications*, April 1994, at 76, 78). Nextel has agreed to merge with Dial Page and OneComm and to acquire all Motorola's SMR operations. Assuming these transactions close, Nextel's licenses will cover approximately 85 percent of the nation's population in bandwidth slices ranging from 10 to 15 MHz per market (*Multichannel News*, Sept. 5, 1994), and it will have more than 650,000 of the reported 1.5 million SMR subscribers nationwide (*TR*, Aug. 8, 1994, at 39-40; *Mobile Satellite News*, Mar. 2, 1994). Because of the large number of systems under common ownership and the common use of the Motorola Integrated Radio System (MIRS) digital technology, Nextel will have advantages in offering seamless national service (*Land Mobile Radio News*, April 1, 1994). Nextel also has equity shares in Canadian and Mexican SMR providers.

44. An important issue is how long it will take ESMR providers to make their services available as substitutes for cellular service. Motorola has introduced handsets for transmitting voice, data, and fax messages over ESMR. According to press reports, Nextel offers ESMR integrated voice,

paging, and two-way radio services in Northern California and Greater Los Angeles and expects to offer these services in several other areas by the end of 1994, when it expects to begin testing switched data services as well. It expects to begin testing packet switched services in 1995. OneComm plans to offer ESMR service in Denver, Seattle, and Portland, Oregon, in 1994. Dial Page is aiming to offer service in the South and Midwest in 1995. It is also reported that the major "MIRS-based ESMR providers have banded together and said they will offer seamless nationwide service as they deploy their networks during the next 2-1/2 years" (*Communications Week*, June 6, 1994).

E. Competitors for Cellular in Wireless Data Transmission

45. Wireless data transmission service will be even less concentrated than cellular-type service because all the providers of cellular-type service will be in the market along with a number of other types of providers.

46. At the local level, cellular providers can offer data services using circuit-switched technology. For example, in Buffalo the non-wireline carrier offers circuit-switched cellular data service for purposes such as remote monitoring (*Communications Daily*, Aug. 3, 1994). Cellular providers are implementing a nationwide network using cellular digital packet data (CDPD) technology. A number of cellular companies have begun using CDPD, including McCaw in Las Vegas and Bell Atlantic Mobile in Baltimore-Washington and Pittsburgh (*Computer Reseller News*, May 23, 1994, at 152; *Financial Services Report*, May 25, 1994). Bell Atlantic has predicted that CDPD will be in the top 60 markets by the end of 1994 (*Advanced Wireless Communications*, May 11, 1994).

47. SMR providers currently can offer wireless data service at the local level. There are also two providers of national wireless data network services, both of which are non-cellular: Ardis, owned by Motorola, and RAM Mobile Data, owned by BellSouth and RAM Broadcasting, have packet switched radio networks in large cities nationwide. In addition, satellite-based services offered by companies such as Qualcomm are used

heavily by the trucking industry for purposes such as dispatching, messaging, and tracking vehicle and package locations (*En Route Technology*, July 5, 1994).

48. Non-cellular competitors that are entering wireless data service include Metricom, which has a network operating in the Silicon Valley area and hopes that by the end of 1996 the top 30 U.S. metropolitan sites will be equipped and running; Nextel and other ESMR providers; and narrow-band PCS providers, such as Mobile Telecommunication Technologies' National Wireless Network, which is slated for roll-out in mid-1995 (*TELECOMREG Digest*, Aug. 8, 1994; *Computer Reseller News*, April 4, 1994, at 55; *Mobile Data Report*, Feb. 28, 1994). PageNet, which has three national paging frequencies, is also able to provide wireless data services (*Newsbytes News Network*, July 25, 1994).

F. *Concentration*

49. In order for the essential facilities theory to provide the basis for imposing access requirements, such as interconnection obligations in the case of mobile telecommunications services, a single supplier must have a monopoly over a facility that is essential to downstream competitors. In addition, there must be a record of abuse, and there must be a reasonable basis to believe that the economic distortions caused by mandatory access would not make matters worse. If two or more competitors each control such facilities, the matter is more complex, because one must demonstrate that those firms coordinate their behavior to deny access and thus limit competition in the downstream market.

50. A number of parties have estimated concentration in mobile telecommunications services using Herfindahl-Hirschman Indexes (HHIs) and have compared these HHIs against standards contained in the Department of Justice and Federal Trade Commission 1992 Horizontal Merger Guidelines. The HHI is calculated by summing the squares of the market shares of the firms in the market. The smaller the number of firms and the more unequal their sizes, the larger the HHI will be, and by defi-

nition the more concentrated the market is. For example, if there are five equal-sized firms, each with 20 percent of the market, the HHI equals $5 \times (20)^2$ or 2000. If the HHI is above 1800, under the Merger Guidelines the market is “highly concentrated.”

51. It is widely recognized that the HHI thresholds specified in the Merger Guidelines are not based on empirical evidence concerning the relationship between concentration and the likelihood that market power will be exercised (Paul A. Pautler, “A Review of the Economic Basis for Broad-Based Horizontal-Merger Policy,” *Antitrust Bulletin*, Fall 1983, 571-651; Noel D. Uri and Malcolm B. Coate, “The Department of Justice Merger Guidelines: The Search for Empirical Support,” *International Review of Law and Economics*, 1987, 113-20; F. M. Scherer and David Ross, *Industrial Market Structure and Economic Performance*, Houghton Mifflin, 3d ed., 1990, chap. 11). Also, the concentration thresholds in the Merger Guidelines are intended to implement the incipency standard of Section 7 of the Clayton Act. As I have explained in ¶23, the Department of Justice has held that these standards are not relevant for evaluation of decisions on whether or not to regulate an industry. In the present context, the Merger Guidelines standards may be applicable to the extent that there is a concern with collusive exclusionary behavior, but they are otherwise not relevant because this is not an incipency issue.

52. Besen and Burnett indicate that capacity is an appropriate basis for measurement of market shares “Because the available evidence suggests that firms may move with relative ease from the provision of one mobile telecommunications service to another” (Besen and Burnett at 35). They argue that the appropriate measures of market shares and concentration are based on *effective* capacity, which takes account of the differences in bandwidth requirements per unit of information transmitted for analog and digital services (Besen and Burnett at 36). As long as cellular systems offer analog services, their shares of effective capacity will be less than their shares of bandwidth, because PCS and ESMR services are all digital. Forecasts of market shares and concentration based on effective capacity are complicated by the need to make assumptions about (i) the amount of

bandwidth cellular systems will need to allocate to analog services in coming years, (ii) the relative efficiency of analog and digital services in transmitting information, (iii) the amount of bandwidth cellular providers and other entities will obtain in future PCS license auctions, and (iv) the bandwidth available to ESMR.

53. Using some of the same assumptions made by Besen and Burnett, suppose that cellular systems devote 10 MHz to analog, and that digital cellular permits a 6-fold increase in effective capacity compared to analog cellular. Suppose also that the three 30 MHz and the three 10 MHz broadband PCS licenses are awarded to six independent non-cellular firms, and that SMR/ESMR bandwidth is consolidated and digitized by one additional company with 10 MHz. In this case, based on the Besen-Burnett methodology, each cellular system would have a 10.2% share of effective capacity, each 30 MHz PCS provider would have a 18.4% share, and each 10 MHz PCS provider and the ESMR provider would have a 6.1% share. The HHI would be 1370.

54. On the other hand, if one assumes that each cellular provider would obtain a 10 MHz PCS license, the cellular shares would be 16.3% and the HHI would be 1620. If in addition cellular systems convert entirely to digital technology, their shares would be 19.4% and the HHI would be 1651.

55. Finally, if one assumes that a minimum of 30 MHz of bandwidth will be necessary to provide some cellular-type services competitively, the cellular shares for those particular services (assuming a uniform fraction of the capacity of each provider could be devoted to them) would be 21.9% and the HHI would be 2012. Of course, this list does not exhaust the possibilities.

56. These calculations ignore the possibility that providers with narrowband licenses, including paging licenses and narrowband PCS licenses, users of the 20 MHz allocation for unlicensed spectrum, users of UHF spectrum (in the event of a relaxation of Commission regulations),

or satellite-based services will enter as new providers of competitive cellular-type services during the next several years. Hausman predicts that less than one-third of the spectrum allocated to paging as of 1992 will be used for paging by the year 2000 (Hausman at 7-8), which suggests that it could be used for other services.¹

57. The Cellular Resellers Association (CRA) has computed market shares and concentration based on a forecast by the Personal Communications Industry Association (PCIA) for the number of subscribers for cellular, PCS, SMR/ESMR, and satellite services in 1998 and 2003 ("Reply Comments of Cellular Resellers Association," *Investigation on the Commission's Own Motion into Mobile Telephone Services and Wireless Communications*, CPUC, I. 93-12-007, Mar. 18, 1994, at 25-26 and Table 2). Because the PCIA has forecast that PCS and SMR/ESMR will have lower shares of subscribers than of effective bandwidth in 1998 and 2003, this alternative methodology leads to higher shares for cellular systems and higher HHIs than those reported above based on effective bandwidth. There are two reasons to base market shares and concentration on capacity rather than on the PCIA forecasts for the number of subscribers. First, it is appropriate to use capacity rather than sales in measuring market shares when capacity provides a better measure of the competitive significance of a firm. For example, a firm with relatively small sales but significant capacity is likely to be in a position to expand sales rapidly in the event that its competitors raised their prices. Its competitors will therefore be less likely to raise prices than they would be if the firm lacked this capacity. Hence, in this

¹ It has been suggested that there may be four or five companies in most cities (*Wall Street Journal*, Feb. 11, 1994, at R22, citing a consultant at Arthur D. Little; Edward M. Greenberg and Catherine M. Lloyd, "Telecommunications Services: POP Out: The Changing Dynamics of the Cellular Telephone Industry," *U.S. Investment Research*, Morgan Stanley, Apr. 23, 1991, at 20). If there are four or five companies with equal shares of effective bandwidth, the cellular shares would be 25 percent or 20 percent and the HHI would be 2500 or 2000. However, if the number of competitors in an area is a result of economies of scale and the size of the markets, there may be spectrum available for a new entrant in the event of anticompetitive behavior.

example, capacity is a better measure of the competitive significance of this firm. Second, the PCIA's forecasts for number of subscribers are speculative, and hence the CRA's market share and HHI calculations are unreliable even if it were appropriate to measure market shares by sales.

58. One cannot draw conclusions regarding either the performance of CMRS markets or the need for government regulation of interconnection from market shares and concentration alone, as some have tried to do (Public Service Commission, State of New York, "Petition to Extend Rate Regulation," *In the Matter of Implementation of Sections 3(n) and 332 of the Communications Act: Regulatory Treatment of Mobile Services*, FCC GN Docket No. 93-2524, Aug. 5, 1994 (NYPSC Petition), at 4). In evaluating interconnection regulations, one must also evaluate entry conditions, the actual performance of the market, the likelihood of collusion to deny interconnection, and the costs of regulation.

G. Entry

59. Entry by new competitors will be facilitated by the rapid growth in demand for mobile services.

60. It has been suggested that "The cost of the FCC license will be a formidable initial obstacle" to new entry into cellular-like markets ("Petition of the People of the State of California and the Public Utilities Commission of the State of California to Retain State Regulatory Authority over Intrastate Cellular Service Rates," *In the Matter of Implementation of Sections 3(n) and 332 of the Communications Act: Regulatory Treatment of Mobile Services*, FCC GN Docket No 93-252, Aug. 8, 1994 (CPUC Petition), at 72). This makes no economic sense. In fact, the price of licenses is determined by competition among the companies that want to enter. There are so many parties interested in entering that there is not enough spectrum to go around. The market price of licenses has no role whatsoever in limiting the number of new entrants. Rather, the price simply rations the available spectrum, assuring that it goes to the companies that expect the

highest returns from entry. A high price is a signal that entry is profitable, not a barrier to entry.

61. As further evidence on the difficulty of entry, it has been alleged that “cellular carriers have launched initiatives explicitly aimed at placing consumers in long-term contract plans in part to prevent them from switching to alternate technologies. This strategy harms consumers and competition” (CPUC Petition at 45). In California, the contracts in question offer lower prices in return for commitments to purchase specified amounts of service over periods of one to three years and to pay a fee in the event of early termination (CPUC Petition at 30-31, 36). There is a serious logical flaw with the assertion that such contracts harm consumers. Customers cannot be made worse off by being offered an additional pricing option beyond the basic plan. If customers choose alternative plans, one can infer that those plans provide pro-competitive price reductions that more than outweigh any conditions and termination fees that are imposed. Under this theory, a financial institution’s 5-year certificate of deposit with a “substantial penalty for early withdrawal” would raise concerns. The Federal Communications Commission has found that, on balance, offers of equipment discounts to customers willing to commit to service with a particular licensee for a minimum length of time are pro-competitive and in the public interest (*Second Report* at n. 305).

H. *Performance*

62. Parties that favor regulation of cellular carriers have offered analyses and data that allegedly demonstrate that cellular carriers have been exercising market power. In this section, I examine numerous types of evidence that have been offered and find that none of them, individually or collectively, demonstrates the exercise of market power. Most of the claims about anticompetitive behavior are based on faulty economic analysis. By contrast, there is evidence of competitive behavior, and cellular customers have been benefiting from increasing service at declining real prices.

1. Efficient Allocation of Cellular Spectrum

63. One cannot hope to analyze the performance of the markets in which cellular services compete without an understanding of the implications of the scarcity of cellular spectrum. Electromagnetic spectrum suitable for cellular communications is scarce. If it were given out free, there would not be enough to go around. This is obvious from the use of hearings, lotteries, and auctions to allocate spectrum licenses. As a result of inefficient Commission spectrum allocation policies, spectrum available for cellular service has been more scarce than spectrum available for various other uses. As long as the Commission constrains the reallocation of spectrum to the uses for which it would have the greatest value to consumers, what is relevant to understanding the performance of the markets in which cellular services compete is the scarcity of spectrum that can be used for cellular and cellular-type services.

64. When a resource, such as spectrum, is scarce, the primary concern of economic policy should be to make sure that it is allocated efficiently among alternative uses. In the case of cellular spectrum, radio channels should be used only by customers who are willing to pay the "opportunity costs" of their calls. The use of a radio channel has opportunity costs because use by one person prevents use by another, or use by one person degrades the quality of service for others because of blocking. The only practical way to achieve an efficient allocation of cellular spectrum is to price services at a level that covers opportunity costs. Suppose, for example, that there is sufficient spectrum to make only 100 calls (given a level of service quality). For simplicity assume there are no opportunity costs other than those arising from spectrum scarcity. Suppose that there are 200 people willing to pay \$1 or more per call, 150 willing to pay \$1.50 or more per call, and 100 people willing to pay \$2 or more per call. For resources to be allocated efficiently, prices must be equal to \$2 per call even if there are no opportunity costs other than spectrum. Suppose, for example, that prices were set at \$1. In that case, 200 people would try to make calls, half the calls would be blocked, and roughly 50 of the calls completed would be made by customers who value those calls

at under \$2 each. At the same time, there would be roughly 50 customers willing to pay \$2 or more per call who would be unable to complete their calls. By raising the price to \$2, we succeed in allocating the available capacity to the people who are willing to pay the most for it.

65. The preceding example makes it clear that resources would be allocated very inefficiently if the price of cellular service did not reflect the scarcity of spectrum, that is, the opportunity costs of calls in terms of other calls that would be foregone. From this, we can conclude that in order for resources in the cellular industry to be allocated efficiently: (a) Prices must reflect the scarcity of spectrum, that is, the opportunity costs of spectrum in terms of foregone or degraded services for other cellular customers. (b) Whether the cellular company received its spectrum license free or purchased it in the market has no effect on the cellular service prices that are needed to achieve an efficient allocation of resources. (c) Even in a fully competitive market, the prices for cellular service will reflect the competitive scarcity value of spectrum. This is efficient and in the public interest. (d) Even in a fully competitive market, the prices at which cellular licenses and systems are sold in the market will reflect the competitive scarcity value of spectrum. (e) In order to be meaningful for economic analysis, measures of the replacement cost of cellular systems must include the competitive scarcity value of cellular spectrum. (f) In order to be meaningful for economic analysis, rates of return and q-values (to be defined below) must be based on replacement values that include the competitive scarcity value of spectrum.

66. It has been argued that "The fact that cellular license values reflect more than scarcity of spectrum is evidenced by comparison with the license value of other spectrum allocations. If spectrum scarcity was the only or primary determinant of license value, we would expect the value per-MHz of licensed spectrum to be roughly equivalent" across uses (CPUC, Decision 94-08-022, *Investigation on the Commission's Own Motion into Mobile Telephone Service and Wireless Communications*, I. 93-12-007, Aug. 3, 1994 (CPUC Decision), at 60). This makes no economic sense. When there are constraints on the reallocation of spectrum among uses,

the relative market values per MHz of spectrum allocated to two different uses will depend heavily on the relative demand for those two services, as well as differences in rate regulation and other costs. Furthermore, to achieve an efficient allocation, cellular service prices must reflect the scarcity value of cellular spectrum to other cellular users, not simply the value in non-cellular uses where spectrum may have a lower market value as a result of the Commission's inefficient spectrum allocation policies.

2. Output and Capacity

67. Capacity for and output of cellular service has expanded rapidly throughout the past decade. The number of cellular subscribers increased from near zero in 1984 to 6.4 million in June 1991 and 19 million in the first half of 1994 (Hausman at 10; *Washington Post*, Sept. 6, 1994, at B4, citing the Cellular Telecommunications Industry Association). Besen *et al.* report that "Growth in cellular airtime also has been substantial, although it has been slower than the growth in number of subscribers because later subscribers have tended to use the service less intensively than earlier adopters" (Stanley M. Besen, Robert J. Lerner, and Jane Murdoch, "The Cellular Service Industry: Performance and Competition," Charles River Associates, 1992, at 1).

3. Pricing

68. The real prices of cellular service, adjusted for inflation, declined during each portion of the past decade for which I am aware of systematic studies. Besen *et al.* (at 2) report that on average in the ten largest cellular service areas real prices for access and 250 minutes per month of prime time use declined by 38 percent during 1983-1991. Another study reports that on average real prices for 250 minutes of air time per month declined by 27 percent or more during 1985-91 in the top 30 cellular markets (U.S. General Accounting Office, *Telecommunications: Concerns About Competition in the Cellular Telephone Service Industry*, 1992 (GAO), at 22-24). Hausman (at 13) reports that real prices declined about 10-12 percent per year during 1987-92. A Cellular Carriers Association of California

study reportedly found that, depending on market size and level of usage, real prices decreased by an average of 12 percent to 30 percent in California during 1990-93, based on the lowest-cost pricing plan available (CPUC Decision at 39). In New York, the Public Service Commission found that "On a broad basis, the declines in revenues per access number and revenues per airtime minute indicate that overall average prices are declining" (NYPSC Petition at 8). At the same time, customers have benefited from increasing service areas.

69. In a study using data for 1989 and 1991, Hausman found that prices of cellular service were not lower in states that regulated those prices than in states that did not regulate them. He found that prices were 5 to 16 percent higher in states that required advance notice tariff filings for price changes (Hausman at 10).

70. In spite of this evidence of competitive performance, it has been argued that price levels, and the behavior of prices over time, indicate that cellular carriers have been exercising market power. For example, the CPUC indicates that "Cellular rates of major California carriers remain among the highest in the nation" (CPUC Petition at 45-46). Even if true, that would not suggest anticompetitive behavior. Rates have to be highest somewhere. It should be noted that the CPUC also reports that "in 1992 Sacramento had among the nation's *lowest* cellular rates" (CPUC Petition at 46, emphasis added). Also, California probably has among the highest prices in the nation for many goods and services. The CPUC has failed to offer an analysis of prices that holds the determinants of competitive prices—demand and costs—constant, and thus prices in California may be explained by higher demand or higher costs. If demand for cellular service is high, resources will be wasted if prices do not reflect the greater scarcity of spectrum, as I have discussed above. Similarly, if costs for cellular service are high, resources will be wasted if prices do not reflect those costs.

71. As further evidence of the exercise of market power, it has been alleged that the rates of the two cellular carriers in a market are often uni-

form, and that such uniformity raises questions about competition (CPUC Petition at 38, with regard to basic rates; Louisiana Public Service Commission, "Petition," *Petition on Behalf of the Louisiana Public Service Commission for Authority to Retain Existing Jurisdiction Over Commercial Mobile Radio Services Offered Within the State of Louisiana*, FCC PR File 94-SP5, Aug. 5, 1994 (LPSC Petition), at 29, 33, with regard to all plans and rates). However, the Cellular Carriers Association of California found that in California competitors charge uniform rates only in the case of basic service in Los Angeles (CPUC Decision at 39). Furthermore, there are differences among the discount pricing plans under which many subscribers obtain service in California. In any case, similarity of prices for similar services does not carry with it any suggestion of anticompetitive behavior. One expects a tendency toward similarity of prices for similar services regardless of market structure or performance, and regardless of differences in the cost structures of the competitors.

72. It is also incorrect to interpret differences in the structures of prices charged by the two cellular carriers in an area as *prima facie* evidence of an anticompetitive allocation of markets, just as it is incorrect to suggest that only the supplier with the lowest price for a particular usage pattern is relevant to market performance (LPSC Petition at 29).

73. Curiously, it has been argued that the introduction of discount pricing plans has not been pro-competitive. The CPUC reports that "The analysis we undertook was unable to determine whether rates statewide went down as a result of the increased use of discount plans" during 1989-1993 (CPUC Petition at 43). This is nonsense. An increasing share of subscribers obtained service under discount plans (CPUC Decision at 40). From this one can infer that the effective prices of discount plans were below the expected prices of basic plans for a substantial share of users, taking account of conditions and termination fees in the discount plans.

74. It has been submitted as an argument in favor of regulation that "the proliferation of 'discount' plans, including volume discounts, is additional evidence that the carriers are not using their allocated spectrum to

maximum capacity. ... [I]t is obvious that the carriers are actively seeking to increase usage of existing spectrum capacity" (CPUC Petition at 54). However, this suggests that cellular systems are engaged in a pro-competitive effort to expand output and is odds with assertions regarding anti-competitive behavior.

75. As further evidence of the exercise of market power, it has been argued that prices have not declined as much as capital and operating costs (CPUC Petition at 35). However, the comparison offered does not use an appropriate measure of capital costs, which should reflect replacement costs of cellular systems, including startup costs and intangible assets. Moreover, to avoid wasteful use of scarce spectrum, the price charged to each cellular user must reflect the opportunity cost of spectrum to other potential users, as I have discussed above. Thus, increasing demand could explain an increase in prices relative to costs even when providers were behaving competitively.

76. An *industry demand curve* for cellular service measures the total demand for services from all cellular providers in a market, as opposed to the demand for the services from just one provider. The price elasticity of demand at a point along a demand curve measures how responsive the quantity demanded is to a change in price. If the price elasticity of demand is equal to one, then a one percent increase in price leads to a one percent reduction in quantity demanded. This implies that total revenue (price times quantity) is not changed by a small price increase. If the price elasticity is less than one, a one percent increase in price leads to a reduction in quantity demanded of less than one percent. This implies that total revenue will increase if price is increased. It is common for an industry demand curve to be characterized by a price elasticity of demand of less than one at low price levels and for the elasticity of the curve to increase as the price level is increased.

77. Hausman estimated that cellular systems typically operated at a point along the industry demand curve for cellular services at which the price elasticity of demand was substantially less than one (Hausman at